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**(54) Title:** SPORTS DRINK AND DRINK POWDER**(57) Abstract**

The invention relates to a sports drink and a powder composition therefor, which contains a major portion of polysaccharide containing maltodextrine, a balanced proportion of potassium chloride and magnesium sulfate, a restoring amount of sodium chloride, a taste-masking ingredient, and microcrystalline cellulose as an excipient. The molar ratio between potassium and magnesium is about 4:1. The sports drink assists in retaining and restoring the body vigor and liquid balance in connection with exercise.

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## SPORTS DRINK AND DRINK POWDER

The present invention relates to a sports drink with a balanced proportion of magnesium and potassium as well as to a powder for producing such a drink. The drink is especially suitable for sportsmen since its composition has been designed for retaining and restoring of the body vigor and liquid balance in connection with exercise.

The importance of a balanced intake of potassium and magnesium and the adverse effects of sodium have been known for some time. The general population, especially those of the industrialized countries eat a lot of food which contains large amounts of table salt, i.e. sodium chloride. On the other hand, the intake of potassium and magnesium has been reduced and is often at a too low level.

Normal food should preferably contain sodium and potassium in a molar ratio of Na:K = about 1:1 and magnesium and calcium in a molar ratio of Mg:Ca = about 2:1, while the balance between magnesium and potassium should be Mg:K = about 1:4 in order for the intracellular electrolyte balance to be optimal.

EP patent 0 377 119 discloses a composition which is used as a natural-food product and a food additive, and which contains potassium chloride 65 %, magnesium sulfate 28 %, and additionally a compound which yields hydrogen ions and is preferably composed of lysine hydrochloride, citric acid, glutamic acid and ascorbic acid. This so-called ANTISALT<sup>R</sup> salt preparation has been made into powders and pellets, which are ingested orally. These formulations have the disadvantage that their taste is objectionable and bitter.

During exercise the body loses liquid and salt due to an excessive perspiration. At the same time the energy reserve in the blood, i.e. the blood sugar level is reduced and the sportsman feels tired. Eating salt and sugar and drinking water to counteract the loss may help, but it is difficult to get the intake of the various compounds at the right level.

Various sports drinks have been recently designed most of which aim at restoring the energy balance in one way or another. The compositions often contain sugar compounds as an energy source and stimulating compounds such as proteins and coffeein. The compositions generally lack a balanced formulation of potassium, magnesium and sodium. Especially they lack a proper balance between potassium and magnesium, which deficiency, in fact, makes

the composition ineffective in restoring and retaining the energy and liquid balance of sportsmen.

The object of the present invention is to provide a sports drink with a balanced proportion of magnesium, potassium and sodium and with an energy source which is especially suitable for restoring and retaining the bodily vigor of sportsmen.

A special object of the invention is to provide a sports drink with a correct balance of potassium and magnesium corresponding to that of the transportation mechanism through the cell membrane. Thus the molar ratio between potassium and magnesium should be about 4 to 1.

Another objection of the invention is to provide a sports drink with a pleasant taste in spite of the objectionable and bitter taste of potassium chloride.

The object of the invention is also to provide a powder for a sports drink, which powder may be easily dissolved in water to make a sports drink.

Said objects are achieved according to the present invention, the characteristics of which are defined in the accompanying claims.

Thus, the invention relates to a sports drink powder composition comprising a major portion of a polysaccharide containing compound, a balanced proportion of a potassium compound, a magnesium compound and a sodium compound, and further including a taste-masking ingredient. The composition may additionally contain excipients or consistency agents, as well as weak organic acids.

The sugar compound is preferably maltodextrine which is mainly composed of polysaccharides. The amount of polysaccharides in maltodextrine is about 80-90% depending on the raw material used to produce the same. Maltodextrine also contains about 10% maltotriose, about 5% maltose, and about 1 to 3% dextrose.

The drink powder composition of the present invention contains about 85 to 96%, preferably about 90 to 95% and most preferably about 93 to 94% maltodextrine calculated on the dry weight of the powder.

The preferred sodium compound of the drink powder composition is sodium chloride, since

sodium chloride is lost with perspiration. The amount of sodium chloride is about 2.5 to 5%, preferably about 3 to 4% by weight of the dry drink powder.

The preferred potassium compound of the drink powder composition according to the invention is potassium chloride since it is easily dissolved in water. Potassium chloride has an inherent bitter taste, which, however, is masked in the present composition by taste-improving compounds.

The amount of potassium chloride in the composition is critical and should not vary too much. The preferred amount of potassium chloride is about 1/3 by weight of the amount of sodium chloride. Thus, a percentage of about 1.1 to 1.4% by weight is suitable, the most preferred amount of potassium chloride being about 1.2 to 1.3% by weight of the dry drink powder.

To provide the correct balance of magnesium and potassium, the drink powder composition contains a water soluble magnesium compound such as magnesium oxide or magnesium carbonate, and most preferably magnesium sulfate heptahydrate. When magnesium sulfate is used, it should be included in an amount which is balanced with the amount of potassium chloride in a weight ratio of about 1:2 to 1:2.5. The preferred amount of magnesium sulfate in the drink powder is 0.45 to 0.65%, preferably about 0.55%.

The ratio between potassium and magnesium is critical to the composition and its allowed variation is not more than about 2.5% by weight. The preferred ratio of K:Mg is 4:1 and the preferred ratio of KCl to MgSO<sub>4</sub> is 2.28:1.

The drink powder composition according to the present invention further contains a taste-improving or taste-masking ingredient at approx. 0.01 to 0.03% by weight on the dry powder. The preferred taste-masking ingredient is Gentianae powder or extract.

Primarily, Gentianae powder is prepared by evaporating the solvent and water from an extract or tincture prepared from dried roots of plants of the Gentianae family. Gentianae powder completely masks the objectionable and bitter taste of potassium chloride, and additionally it increases the secretion of saliva and stimulates the appetite.

The drink powder composition may also contain an organic carboxylic acid such as glutamic, tartaric, citric acid and/or ascorbic acid. Preferred amounts of these acids are from 0 to 0.5% by weight. The acids improve the solubility of the potassium and magnesium compounds and

assist in their passage through the cell membrane, which accelerates restoration.

The composition according to the invention may additionally contain other physiologically acceptable ingredients, such as excipients. Microcrystalline cellulose and acacia fibers are examples of acceptable excipients giving a suitable consistency to the composition. The amount of excipient may vary between 0 and about 1% by weight of the dry drink powder.

Finally, the drink powder composition according to the present invention may contain aroma compounds up to a percentage of about 1 to 2%. Acceptable aroma compounds are synthetic and natural aroma compounds generally used in drinks of this kind. A typical example is citrus fruit powders such as orange or lemon juice powders.

The present drink powder composition is unique in that it provides a balanced intake of potassium and magnesium while restoring the lost sodium chloride and providing a slow release energy source for prolonged endurance and quick restoration in connection with exercise.

Maltodextrine is the preferred energy source in the present invention since the polysaccharides of maltodextrine are digested more slowly than simple saccharides. Thus the blood sugar levels will rise in a slower and more balanced fashion. This results in that the blood fat level increasing effect of the hydrocarbons will be lower than when using lower saccharides. Further, the effect of the polysaccharides on insulin excretion is at a lower level. The result is that even at prolonged exercise, the blood sugar level will be retained for a longer time at a positive level compared to the initial value than when using lower saccharides.

Maltodextrine and sodium in combination with the other ions, potassium, magnesium, and also chloride, in the proportions described in the present invention increases the endurance during prolonged exercise and speeds up the restoration after such exercise.

The present invention also relates to a sports drink which is produced from the above described drink powder by mixing the same in water. The powder may of course alternatively be dissolved in a fruit juice. However, this is not the preferred procedure since the drink powder contains aromatic substances which will preclude the necessity of adding further taste. The powder also contains a balanced amount of the various compounds and mixing it in a fruit juice might spoil some of the carefully balanced composition.

The dry powder composition according to the invention may be prepared in a conventional manner by dry-blending the ingredients to form a homogenous drink powder.

The drink powder according to the invention is preferably packed in single-dose sachets. For use, the contents of a sachet are stirred into water and ingested before and/or after exercise.

The invention is described below in greater detail with the aid of some illustrating examples which should not be taken as limiting the scope of protection.

Example 1

Preparation of Gentianae powder

Water and alcohol are evaporated out from Gentianae tincture to produce Gentianae powder.

Example 2

Preparation of ANTISALT<sup>R</sup> salt powder

100 g of ANTISALT<sup>R</sup> salt powder was produced by mixing the following dry ingredients into a homogeneous powder:

potassium chloride	55 g
magnesium sulfate	24 g
microcrystalline cellulose	20 g
glutamic acid	0.2 g
ascorbic acid	0.2 g
Gentianae powder	0.9 g

The Gentianae powder was blended with the glutamic acid, and this mixture was then blended with the other ingredients to produce a potassium-magnesium balancing salt powder.

Example 3

Preparation of a drink powder

A sports drink powder was prepared by mixing the following dry components into a homogeneous mixture:

maltodextrine	93.20%
sodium chloride	3.65 %
ANTISALT <sup>R</sup> salt powder	2.28 % (prepared as in Example 2)
Lemon juice powder	0.65 %

Example 4

## Preparation of a drink powder

A sports drink powder was prepared by mixing the following dry components into a homogeneous mixture:

Maltodextrine	93.48 %
NaCl	3.76 %
KCl (E 508)	1.25 %
Magnesium sulfate	0.54 %
Lemon aroma	0.50 %
Acacia fiber	0.46 %
Glutamic acid (E 620)	0.005 %
Ascorbic acid (E 300)	0.005 %
Gentianae extract	0.021 %

The energy content of the above drink powder was 1526 kJ (365 kCal) per 100 g.

The product was analysed and was found to contain per 100 g:

Carbohydrates	89.7 %
Moisture	3.9 %
Fat	0 %
Proteins	0 %
Potassium	625 mg
Magnesium	103 mg
Salt (NaCl)	3.76 g

This drink powder was packed into single-dose sachets containing 40 g each.

Example 5

## Preparation of an aqueous sports drink

A sachet produced according to Example 4 was dissolved in 1/2 l of water to provide a sports drink having a carbohydrate content of 6.64 %. The drink is suitable for prolonged exercise and/or exercise in hot weather.

Another sachet produced according to claim 4 is dissolved in 1 l of water to produce a weaker sports drink which is suitable for milder exercise.

## Claims

1. A sports drink powder composition, characterized in that it contains a major portion of a polysaccharide containing compound, a balanced proportion of a potassium compound and a magnesium compound, a sodium compound, a taste-masking ingredient, and optionally excipients or consistency agents and/or weak organic acids.
2. A sports drink powder composition according to claim 1, characterized in that said polysaccharide containing compound is maltodextrine which is included in an amount of about 80-90% by weight based on the dry weight of the drink powder, preferably about 85 to 96%, more preferably about 90 to 95% and most preferably about 93 to 94% by weight based on the dry weight of the powder.
3. A sports drink powder composition according to claim 1 or 2, characterized in that said sodium compound is sodium chloride which is included in an amount of about 2.5 to 5%, preferably about 3 to 4% by weight of the dry drink powder.
4. A sports drink powder composition according to claim 1, 2 or 3, characterized in that said potassium compound is potassium chloride which is included in an amount of about 1.1 to 1.4%, preferably about 1.2 to 1.3% by weight of the dry drink powder.
5. A sports drink powder composition according to any one of the preceding claims, characterized in that said magnesium compound is magnesium sulfate which is included in an amount of about 0.45 to 0.65%, preferably about 0.55% by weight of the dry drink powder.
6. A sports drink powder composition according to claim 5, characterized in that said magnesium sulfate is balanced with the amount of potassium chloride in a weight ratio of about 1:2 to 1:2.5, preferably about 1:2.28.
7. A sports drink powder composition according to claim 6, characterized in that the molar ratio of magnesium to potassium is about 1:4.
8. A sports drink powder composition according to any one of the preceding claims, characterized in that it contains a taste-improving or taste-masking ingredient, preferably Gentianae powder or extract in an amount of about 0.01 to 0.03% by weight on

the dry powder.

9. A sports drink powder composition according to any one of the preceding claims, characterized in that it contains excipient(s) such as microcrystalline cellulose in an amount of between about 0 and about 1% by weight of the dry drink powder.

10. A sports drink powder composition according to any one of the preceding claims, characterized in that it contains an organic carboxylic acid selected from the group consisting of glutamic, tartaric, citric acid and ascorbic acid in an amount of about 0 to 0.5% by weight of the dry drink powder.

11. A sports drink powder composition according to any one of the preceding claims, characterized in that it contains an aroma compound, preferably orange or lemon juice powders in an amount of about 1 to 2%, based on the dry weight of the drink powder.

12. A sports drink powder composition according to any one of the preceding claims, characterized in that it contains

Maltodextrine	93.48 %
NaCl	3.65 %
KCl	1.25 %
Magnesium sulfate	0.54 %
Lemon aroma	0.50 %
Acacia fiber	0.46 %
Glutamic acid	0.005 %
Ascorbic acid	0.005 %
Gentianae extract	0.021 %
Aroma compounds	0.65 %

13. A sports drink, characterized in that it contains dissolved in an aqueous medium, preferably in water

Maltodextrine	80-90 %
NaCl	3-4 %
KCl	1.1-1.4 %
MgSO <sub>4</sub> ·H <sub>2</sub> O	0.45-0.65 %
Consistency agent(s)	0-1 %

Glutamic acid	0-0.5 %
Ascorbic acid	0-0.5 %
Gentianae extract	0.01-0.03 %
Aroma compounds	0-2%

based on the dry substance of the sports drink.

14. A sports drink according to claim 13, characterized in that it contains 40 g of said dry substance dissolved in 0.5 to 1 liter of water.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 97/00231

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A23L 2/39, A23L 2/52

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, DIALINDEX(FOODSCI)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5032411 A (STRAY-GUNDERSEN, J.), 16 July 1991 (16.07.91), claims 1-4,9,15,25 --	1
Y	EP 0264117 A2 (OY SINEBRYCHOFF AB), 20 April 1988 (20.04.88), claim 1 --	1-3,11
Y	US 4312856 A (KORDUNER, H.M. ET AL.), 26 January 1982 (26.01.82), claim 1 --	1-3,11
Y	SE 8904190-9 A (TOJKA PRODUKTER HB), 14 June 1991 (14.06.91), page 2, line 30; page 3, line 15, claims 1,3,4,7 --	1-3,11

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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**C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9002494 A1 (SVENSKA MEJERIERNAS RIKSFÖRENING EKONOMI AB), 22 March 1990 (22.03.90), claims 1,7, 8 -- -----	1

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

01/10/97

International application No. <b>PCT/FI 97/00231</b>	
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